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User requirement and prototype design of radio streaming using mind map model for "Forum Diskusi Radio Ponorogo" association

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Abstract. Forum Diskusi Radio Ponorogo (FDRP) is an association with consist of four radio station. Namely is Duta Nusantara FM, Suara Gontor FM, Romansa FM, and Songgolangit FM. Nowadays, FDRP as a terrestrial radio has some problem, and the first problem is to broadcast signal because the area is limited covered. The second problem is the listener are turning from traditional broadcasting to smartphone radio streaming, either using mobile apps or a website. To sustain this radio industry, they must switch to streaming radio via internet. This research aims to explore the need for building the radio streaming to expand the reach of radio broadcast and to design radio streaming media as a collaborative convergence movement. This study uses a mind map model by conducting observations, interviews and discussions to identify initial user needs and prototype techniques to determine the needs of streaming radio applications. This research produces a list of collaboration needs in maintaining the existence of the radio industry in Ponorogo and a prototype design of streaming media for a collaborative radio. For further research, it is hoped can be continued at the stage of making media and implementing streaming radio.

1. Introduction

Forum Diskusi Radio Ponorogo (FDRP) is an association of four terrestrial private radio stations in Ponorogo which was founded in 2018. The radio forum consists of Romansa FM, Duta Nusantara FM, Suara Gontor FM and Songgolangit FM. It is hoped that the four radios in its development FDRP can also embrace community radios in Ponorogo [1]. The forum was formed because of concerns over the declining growth of the radio industry in Ponorogo. As chairman of the association, Muhammad Zahrul Asyary invites FDRP members to start to realize that trying to defend themselves in this digital era cannot be done alone. Even though on the other hand, they are competing, they are aware that the radio industry cannot provide hope for a future life if it is not managed with collaboration [2].

This research was initiated by Asy'ari, who stated that in Ponorogo only 47% had listened to the radio in the last month. The remaining 23% listened to the radio more than two months ago, and 31% listened to the radio more than a year ago [3]. To solve it, the radio industry in a local area such as Ponorogo, it is not enough to assist one radio to another radio, a collective movement is needed, namely by mobilizing all radio in Ponorogo to stimulate the industry. The FDRP association is the only radio association in Ponorogo, but it seems they do not know what to do. Because in addition to being relatively recently



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formed, members are busy turning on their radio and a lack of understanding of the stages of media convergence. But at least, this association has committed capital to save the radio industry in Ponorogo [4] jointly.

One of the FDRP Association is work programs is to create a network radio broadcast program in Ponorogo. This broadcast program allows each radio to convey information by the core and peculiarities of each communication in the same broadcast program. It is hoped that this program can attract public attention to listen to the radio as has been successfully implemented by Suara Surabaya FM (SSFM) radio by distributing all content of conventional radio broadcasts to all new media-based channels owned. [4]. Besides, the FDRP Association is programmed to have a website and social media as promotional media. However, the obstacle is the absence of assigned human resources and the low economic capacity of the FDRP Association members.

As researchers who are concerned about the radio industry, our study program of communication science and informatics engineering, University of Darussalam Gontor has the idea of carrying out community service. This community service is undoubtedly based on the basic knowledge that we have. Mind maps, developed by Tony Buzan as a note-taking technique, are applications that have the power to reveal the thoughts the brain has about a subject from multiple points of view and that activate the right and left lobes of the brain together as an alternative to linear thinking [5]. Mind mapping techniques can improve EFL students' writing skills, increase cohesion, and coherence; paragraph structure of content, and length of writing [6]. Mind map models can make students remember their background knowledge and focus on reading [7]. The Mind Mapping learning method can be used to improve student performance in the Web Programming course [8]. This study aims to expand radio broadcasts from traditional models to mobile streaming and design a streaming media for media radio convergence collaboration.

2. Methods

This study uses a mind map model step, with the first stage exploring the FDRP needs with the researcher. While the second stage is making a streaming radio prototype, as shown in Figure 1. In the first stage, the researcher's user requirements were to trace necessary information from the four radios that were members of the FDRP.

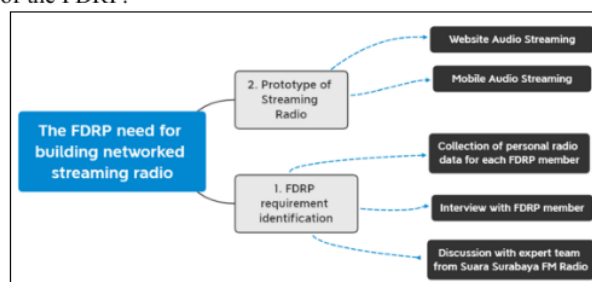


Figure 1. Mind map research model for building FDRP networked streaming radio

The second stage was interviews with FDRP members. It is used to ensure the accuracy of the information that has been obtained. The interview stage, use as well as to deepen knowledge directly from radio managers. In the third stage, our team, members of the FDRP, consulted with experts who had applied the established streaming radio concept. Namely, Suara Surabaya FM (SSFM) with Errol Jonathan as President Director and Bagoes Ardhijanto as Engineering Manager.

3. Result and Discussion

3.1. Result

The results of tracing data collected by researchers to FDRP members are shown in Table 1 via internet media. At this stage, two radios that already have streaming servers but poor quality belong to Suara Gontor FM and with good quality, namely Songgolangit FM radio. Apart from that, only two receivers have personal websites, namely Duta Nusantara and Songgolangit.

Table 1. Summary collection of personal data member FDRP

No	Information literature	Romansa FM	Duta Nusantara FM	Suara Gontor FM	Songgolangit FM
1	Radio has an audio streaming server	Yes, but expired	Yes, but expired	Yes	Yes
2	Radio has a website	No	Yes (dutanusantarafm.com)	Yes, but expired	Yes (songgolangitfm.com)
3	Radio have streaming access via a website	No	Yes, but link expired	No	Yes
4	Radio have streaming access via mobile apps	No	No	Yes	Yes
5	Quality of audio streaming server	-	-	Poor	Good
6	Radio has a video streaming	No	No	No	No

The results of extracting more in-depth information obtained directly through interviews with FDRP members are shown in Table 2. At this stage, the brand position of each radio becomes clearer. Another finding is that most of the revenue is advertisements on terrestrial radio. All receivers also have social media. The most crucial outcome was the radio manager's understanding of radio streaming from the three weak radio categories. The most important thing that underlies the creation of this streaming radio is the two radios that had their licenses revoked because they were unable to pay the annual fee.

Table 2. Summary interview with member FDRP

No	Matter	Romansa FM	Duta Nusantara FM	Suara Gontor FM	Songgolangit FM
1	Brand positioning	Good music for people	The lovely station	"Jaya di Udara Abadi di Hati, Dari Gontor Menyapa Indonesia"	"Kebanggan Ponorogo"
2	Time schedule to broadcast	06.00-24.00 WIB	05.00-24.00 WIB	06.00-24.00 WIB	05.00-24.00 WIB
3	Income	Terrestrial advertising	Terrestrial advertising	Institution Foundation	Terrestrial advertising
4	Have a social media	Yes	Yes	Yes	Yes
5	Radio frequency	98.8 MHz	92.1 MHz	100.9 MHz	99.2 MHz
6	Understanding of radio management	Good	Good	Good	Good
7	Terrestrial license	Expired	Active	Expired	Active
8	Understanding of streaming radio	Low	Low	Low	Low

The third stage is to discuss the problems that have been found in the interview stage to consult with experts from SSFM. Starting from the socialization from the SSFM Engineering Manager explaining things about radio streaming channels so that the minimum needs and problems felt by each radio can be known the technical manager's explanation the radio streaming works is shown in detail in Figure 2. Each receiver is allowed to listen to the process required to start streaming radio, starting from broadcasting in the studio to the listener's ears.

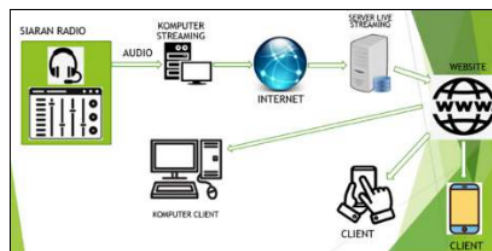


Figure 2. How radio streaming works (source: presentation of SSFM Engineering Manager)

Table 3. Result of discussion FDRP with an expert from SS FM Engineering Manager

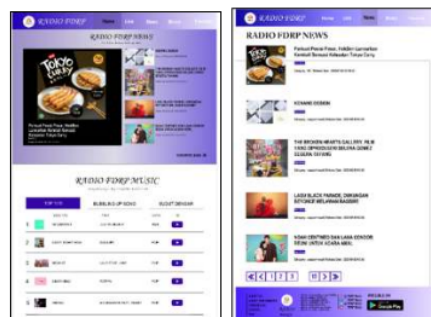
No	Matter	Romansa FM	Duta Nusantara FM	Suara Gontor FM	Songgolangit FM
1	Mixer audio quality	Good	Good	Good	Good
2	Minimum computer specifications for streaming	Not conform	Confirm	Confirm	Confirm
3	Minimum requirements for internet provider ISP	Not conform	Not conform	Not conform	Not conform
4	Streaming server specifications	200 people	Not available	150 people	200 people
5	Availability of website domain	Not available	Available	Not available	Available
6	Network for radio listeners	Not available	Not available	Not available	Not available
7	Availability of mobile applications	Not available	Not available	Available	Available

Table 3 shows the investigative steps of the SSFM Engineering Manager in detecting deficiencies of each FDRP radio. The information presented shows that the urgent problem of each receiver is first, the availability of bandwidth in terms of asymmetric ISPs. It means that the upload and download speeds are 1: 4. It will slow down the process of uploading broadcast sound from the streaming computer to the live streaming server, so it has a longer delay. The second problem is in terms of user analysis.

Table 4. Result of discussion FDRP with an expert from President Director of SSFM

No	Matter	Romansa FM	Duta Nusantara FM	Suara Gontor FM	Songgolangit FM
1	Compatibility of content with radio brands	Confirm	Confirm	Confirm	Confirm
2	Terrestrial transmitter quality and range	Good and local	Good and local	Good and local	Good and local
3	Quality of music	Good	Enough	Enough	Enough
4	Announcer quality (intonation, accentuation, articulation, pace, rhythm)	It needs to be improved by holding workshops on announcer broadcasting			
5	Quality of program	Needs to be improved, focused and deep			
6	The suitability of the music arrangement elements	It needs to be improved and provide more music according to each radio branding			
7	Special advice	1. Radio is an active medium in a dynamic society 2. Success in radio era 4.0: Trust and Impact 3. The age of radio broadcasts "top down" have passed. Radio broadcasts in the 4.0 era should be "bottom-up" with interactive and participatory patterns 4. Content Is the King and Technology Is the Queen			
9	Guide to radio innovation	Extraordinary, Customer engagement, Trendsetter, Business agility, Beneficence, Entrepreneurship paradigm, Well Planned, Good teamwork			

The discussion from the experts was indeed more exciting and in-depth. Moreover, the FDRP radio received more experience and new knowledge that had never been obtained before. In the initial stage, the possible steps for FDRP and the team to be carried out are to build radio streaming media so that it can be accessed via the radioponorogo.org web [1] and android-based applications. At the next stage, the researcher begins to design a prototype design shown in Figure 3 and Figure 4. This prototype was created using the radioponorogo.org website and an android application. Both facilities will have streaming access in the form of audio.



(a) Home page website (b) news page

Figure 3. Prototype website radio streaming FDRP using Adobe XD



(a) Home page (b) navigation menu (c) streaming menu (d) playback menu

Figure 4. Prototype mobile apps based on Android for radio streaming FDRP using Adobe XD

3.2. Discussion

It is also hoped that the FDRP radioponorogo.org website will contain information about the superior broadcast content of each radio. Duta Nusantara FM goal is prioritized local news content [9]. Sanggalangit FM is more about cultural content [10]. Romansa FM radio have sharpened the musical content [2]. Meanwhile, Suara Gontor FM is more towards religious content [11]. It is hoped that with the formation of this networked streaming radio, listeners can get a picture of Ponorogo 's face. The results of designing this prototype are similar to the concepts owned by SSFM [4]. This android radio application was built according to Sanggalangit FM's in 2019 [12]. But with a combination of four radios at once. To produce a community radio broadcasting strategy that can innovate, such as Madu FM radio located in Tulungagung, East Java [13]. In another study, there is a discussion of radio strategies used for disaster mitigation that utilize community radio development in the Kelud Mountain Area in Kediri, Blitar, and Malang [14]. It is hoped that the radio industry in Ponorogo can survive in the industry 4.0 era, such as the radio industry in Kebumen [15].

4. Conclusions

The results of this user requirement provide recommendations to the FDRP that it is essential to expand the reach by adding radio streaming facilities via websites and mobile applications. Besides, this stage also provides advice to FDRP to check what minimum requirements are used to facilitate radio streaming. The advantages of this research are the results of the website prototype and the android application, which contains four radios at once. So that the broadcast content is expected to give a glimpse of Ponorogo, in the next research, it can be continued with implementation of streaming radio to measure the extent to which the listener's development.

Acknowledgements

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